

WHAT IS CLAIMED IS:

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1. An integrated evaluation and simulation system for a weapon system, comprising:
  - 5 a computer system programmed to implement a causal network model comprising an integrated collection of analysis models for creating a virtual representation of a weapon system;
  - at least one virtual simulation system operably coupled to said causal network model to simulate said weapon system; and
  - 10 a user interface operably coupled to at least said computer system to selectively input data into said causal network model and receive information from said causal network model and said virtual simulation system.
2. The system of claim 1, wherein said virtual simulation system comprises:
  - 15 an operation simulator to simulate operations of said weapon system; and
  - an effectiveness simulator to evaluate the effectiveness of said weapon system in a simulated operational environment.
3. The system of claim 1, wherein the computer system further comprises a control system operably coupled to said causal network model to control operation of said causal network model in accordance with one of a plurality of modes of operation.
- 20 4. The system of Claim 3, wherein said control system selectively operates said causal network model in a single-run mode, a dependencies mode, a sensitivities mode, or an optimization mode.
- 25 5. The system of Claim 3, wherein said causal network model performs a sensitivity analysis between an operational performance of said weapon system and an operational performance of one or more selected components or attributes of said weapon system.

5 6. The system of Claim 3, wherein said control system includes an optimization routine that optimizes allocation of one or more selected constrained resources or design of one or more selected components or attributes of said weapon system by utilizing said causal network model.

10 7. The system of claim 6, wherein said optimization routine implements a gradient search methodology to optimize allocation of one or more selected constrained resources or design of one or more selected components or attributes of said weapon system.

15 8. The system of Claim 6, wherein said optimization routine optimizes allocation of at least a cost of said weapon system and a weight of said weapon system.

20 9. The system of Claim 1, wherein said user interface has a menu driven graphical user interface.

10. The system of Claim 1, wherein said user interface visually displays a diagram of said causal network model having commonality with said causal network model.

25 11. The system of Claim 1, wherein said user interface displays data in a modular configuration of three-dimensional plots or numerical values or tables, each plot, value or table being associated with one of a plurality of components or attributes of said weapon system.

12. The system of Claim 1, wherein said causal network model communicates with said virtual simulation system via a series of data arrays.

13. The system of Claim 2, wherein said virtual simulation system is an accredited GroundWars simulation model.

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14. The system of Claim 1, wherein said causal network model includes a relational database to store data that define at least one interrelationship between a plurality of parameters of said causal network model or an operational performance and at least one parameter of said causal network model.

15. The system of Claim 1, wherein said causal network model has a modular implementation and each module is represented by a separate subroutine.

16. An integrated evaluation and simulation computer system for allocating resources across a system architecture of a weapon system to optimize a combat effectiveness of said weapon system, said computer system comprising:  
means for inputting data into and receiving information from said computer system;  
means for distributing data and information between said computer system and at least one virtual simulation system; and  
means for creating a virtual representation of an optimally effective weapon system based on a causal network model of said weapon system.

17. A method of integrated evaluation and simulation for allocating resources across a system architecture of a weapon system to optimize a combat effectiveness of said weapon system, said method comprising the steps of:  
a) providing a computer system having a user interface and a causal network model;  
b) providing a virtual simulation system;  
c) selectively inputting data into said causal network model to create a virtual representation of an optimally effective weapon system;  
d) selectively running said virtual representation of said optimally effective weapon system in said virtual simulation system; and  
e) utilizing information obtained from steps (c) and (d) to enhance said virtual representation of said optimally effective weapon system.

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18. In a computer system, a computer-readable storage media storing at least one computer program that operates as an integrated performance simulator for allocating resources across a system architecture of a weapon system to optimize a combat effectiveness of said weapon system, said program comprising the steps of:

- a) storing a causal network model of said weapon system in said computer system;
- b) obtaining data necessary for said program to create a virtual representation of an optimally effective weapon system;
- c) pulsing said causal network model to create said virtual representation of said optimally effective weapon system;
- d) selectively sending said virtual representation to a virtual simulation system for simulating weapon system operations; and
- e) receiving information about the performance of said weapons system.

19. An integrated evaluation and simulation system for a weapon system, comprising:  
a computer system programmed to implement a causal network model comprising an integrated collection of analysis models for creating a virtual representation of a weapon system and to implement a means to communicate with a virtual simulation system; and  
a user interface operably coupled to at least said computer system to selectively input data into said causal network model and receive information from said causal network model and said virtual simulation system.

20. An integrated evaluation and simulation system for a weapon system, comprising:  
a computer system programmed to implement a causal network model comprising an integrated collection of analysis models for creating a virtual representation of a weapon system; and  
a user interface operably coupled to said computer system to selectively input data into and receive information from said causal network model.